AZTEC MUSIC.

BY H. T. CRESSON.

Primitive music seems to have been limited to a few sounds, produced either by percussion or by means of rude instruments; these sounds or notes in most cases, as musical authorities unite in asserting, represented five tones of the diatonic scale, viz., the tonic or prime note, second, third, fifth and sixth. This would indicate that most barbarous nations were ignorant of the fourth and seventh tones of the scales as known to us. Among the Aztecs, whose remains show superior advancement in the arts, a more thorough appreciation of music evidently existed. To speak first of their percussive music, the huehuetl or large drum of the great temple, at the ancient pueblo of Tenochtitlan, was covered by the skins of serpents, and when beaten could be heard at a distance of several miles. They had clay balls or rattles placed inside of their grotesque clay images, also within the handles attached to their earthenware vessels, which are generally hollow, and contain pebbles or small pellets of clay.

The Poinsett collection possesses several objects among its interesting and valuable specimens of ancient Mexican art, which, unfortunately, are much injured or almost destroyed; these are in the form of a serpent's head, with protruding forked tongue, and have a ball of clay placed within the mouth. The first-named portion is attached to a handle of terra-cotta, to which, after an examination of several specimens, I am inclined to think, were joined large hollow cylinders of the same material. A portion of these still remain united to the handle, suggesting that they must have been concave. When shaken to and fro, the ball within the head of this terra-cotta serpent rebounds from side to side, thus producing a clear sound resembling that given by our American rattlesnake (*Crotalus horridus*) when irritated. A series of these instruments may have been used in their religious ceremonies, and were no doubt placed upon cylinders of large size, balanced so as to regain the perpendicular when set in motion, and in swaying from side to side produced a rattling sound, suggesting that of the serpent above named, which was esteemed a sacred animal by these people.

The desire to make imitations of objects by which they were surrounded emit musical tones, was no doubt suggested by the songs of birds and various sounds produced by animals. Gurney, in his admirable work entitled the "Power of Sound," page 143, states that the third note of the scale has had a natural charm for man as for the cuckoo; thus this well-known musical authority recognizes the fact that certain musical sounds or tones were agreeable to the ears of man; and hereafter, in a series of whistles or pitch-pipes, exhumed from the sepulchres of these Aztec people, I will endeavor to show that one of them is pitched almost precisely in the tones given by the Mexican *Hyladæ*. That musical sounds attract the attention of barbarians and savages, is well authenticated by travelers and those who have lived among them; it may therefore be supposed that these children of nature noticed and strove to reproduce sounds, which, however harsh and unmusical to us, to them were pleasing, because they recalled familiar objects. I am of the opinion that the chattering of macaws and parrots can be imitated upon several instruments I have denominated bird-calls, belonging to the Poinsett collection, in the Academy of Natural Sciences of Philadelphia; by short, quick blowing, they emit sounds very similar to those given by a flock of the above-mentioned birds.

Wind instruments were known to the Aztecs, as above indicated, by the bird-calls; they also possessed flutes, whistles made of sea-shells and flageolets of baked clay or terra-cotta.

There is a vase of this last-named material in the W. S. Vaux collection, now in the museum of the Academy of Natural Sciences of Philadelphia, upon which musical sounds may be produced, by applying the lips to certain parts. This unique specimen of a wind instrument was formerly in the possession of my friend Professor Leidy, and afterward came into that of the late W. S. Vaux, Esq. It is somewhat Roman in form, of a dark color, and ornamented by four grotesque masks, placed around the exterior edge or upper rim of the base, between which, and the interior of the vessel, there is a broad plane some two inches in width, that is perforated at intervals by small slits at each side, exactly opposite the masks. When covered by the lips and blown into, these slits emit certain musical sounds; by closing one of the eyes in the masks, which are hollow and connect by means of air-passages with the interior of the vase and slits upon the plane surface, some approach to a

half-tone lower than that produced by leaving open the holes, can be obtained. The discovery of the musical powers of this vase is interesting, and I shall repeat the account of it given to me by Professor Leidy: "Having been attracted by its artistic form and decoration, I bought the vase, and some time afterward proceeded to clean the slits or elongated holes in the rim and eyes of the masks, these being filled with earth; in applying my lips to the slits, so as to blow out particles of dirt which remained therein, I found to my surprise that they emitted musical sounds."

Mr. E. A. Barber, in a valuable article upon "Indian Music," contributed to the *American Naturalist* of March, 1883, page 270, mentions a curious wind instrument of turtle-like form, which was procured on the island of Ometepec, by the late Dr. Berendt (during his recent excavations among the ruins and mounds of Central America), which, by certain manipulations, can be made to produce a number of airs. . . . . "This unique relic is the first of the kind found among the remains of the old Nahuatl races which evinces any particular advancement in the art of music."

I must beg leave to differ from Mr. Barber in this last assertion, from the fact that in the Poinsett collection there exist Aztec flageolets capable of producing not only the fourth and seventh of the diatonic scale, but also the entire chromatic scale. A description of one of these flageolets will first be necessary, before explaining how the above-mentioned scales may be obtained. It measures nine inches in length, and the thickest portion is about three-quarters of an inch in width—being generally in the centre of the flageolet. The neck is considerably flattened, and measures seven-eighths of an inch in width, gradually contracting at the mouth-hole, and growing more cylindrical in form as it approaches the centre of the instrument. Viewed in profile a graceful curve from above downward joins the neck to the body. At the junction of these two parts may be seen protruding the portion which I have denominated the clay reed (Plate III, A); through this the current of air passes from the lungs of the performer into the body of the instrument, which is pierced by four finger-holes.[1] The

[1] After a careful search I am unable to find in the Poinsett collection of Mexican antiquities, any Aztec flageolets possessing five finger-holes, as stated by Mr. Barber in the *American Naturalist* of March,

terminal portion, or bell, is slightly concave exteriorly, of circular form, and decorated with designs of unique patterns, which have been stamped thereon while in a moist condition, by means of forms or dies; some of these, evidently used for a similar purpose, and made of baked clay, are to be seen in the Academy. The internal portion of this bell is hollow, becoming convex as it approaches the edges, and contracting at the point of connection with the tube or barrel, to a thickness of half an inch. Around this is formed a small cup-like cavity, which bears a most important part in performing upon the instrument. A careful examination and analysis of the construction of these instruments was made from a large number of fragments, some of which were splintered and broken in such a manner that the internal structure was clearly shown. It appeared that they must have been formed in four parts, the neck, clay-reed, body and foot or bell, which were afterwards united together while in a moist condition. Traces of the sutures, although in most cases concealed by the modeling, can be detected in many of the instruments.

It has been asserted in the beginning of this article, that the fourth and seventh tones of the diatonic scales could be produced upon these four-holed instruments (Plate III, fig. 1), and as this assertion is somewhat contradictory to most authorities who have hitherto written upon the subject, my method of proceeding shall be given in detail, with the result obtained. I propose to show—

I. That the fourth, seventh and octave tones of the diatonic scale as known to us exist in the Aztec instruments.

II. That the additional sounds or semi-tones, which constitute the chromatic scale, are likewise present.

That the *fourth* and *seventh* tones do exist in the scale of the ancient Mexicans or Aztecs, and can be produced upon their clay flageolets, will be hereinafter shown.

The objection may be raised, however, that although we, with our knowledge of music, which has only been gained by the experience and wisdom of centuries, can obtain all these tones, yet the Aztecs may have been ignorant of the ability of the

1883, page 270; although the ancient Peruvians seem to have possessed flutes of this description, one of which is now in the cabinet of the American Philosophical Society of Philadelphia, and is mentioned by Mr. H. S. Phillips, Jr., their Corresponding Secretary, in his interesting report for 1882, p. 15.

instruments under consideration to produce them. In answer to this, I will simply state that such an objection would be against the evidence of historical and musical authorities, who have demonstrated that musical instruments of all nations, even of the most savage, have been constructed with a thorough knowledge of their full value and ability in the production of musical tones. This is shown, even in our day, by the savage tribes of Africa, and those of almost inaccessible regions in Asia, who thoroughly understand the instruments in use among them; and from these, we, with all our knowledge and musical comprehension, produce no other tones than can the natives themselves.

The flageolets, having been tested and compared with the flute and organ, were found to be pitched in the following keys: two of similar color and shape stand in the key of C natural, and one of like color in B natural; another, smaller in size, stands in F sharp, and the most perfect sounds emitted came from the flageolet of a dark brown color, which was pitched in the key of B flat; upon this instrument most of the experiments were conducted. It was found that by covering all four holes of the flageolet with the finger, C natural was produced with the bell open (Plate II), and by closing this last-named portion with the little finger, B flat could be obtained, thus lowering the instrument a tone and a half in sound. This action I have denominated finger-stopping, and it is a curious fact, that this same method has been practiced by musicians of our day with the hand upon the French horn. The fact having been demonstrated, that the cavity in the cup-shaped depression had been used for this purpose, it was necessary to find whether the finger-stopping could best be accomplished by the fourth finger of the right hand, or the little finger thereof. After repeated trials, the little finger was found best adapted to that purpose, which obliges the musician to hold the flageolet in the following manner: the body of the instrument rests between the ball of the thumb and the first or index finger of the left hand, covering 4 D (Plate II), thus supporting the instrument. Hole No. 3 C is covered by the second finger of the same hand, No. 2 B by the index finger of the right hand, and 1 A by the second finger; the little finger is used as stated—for the finger-stopping. The instrument being held as above described, the *fourth* of the scale or E flat can be obtained by half-closing the second hole or letter 2 B (Plate II), 3 C and 4 D remaining closed. The *seventh*, which

is A natural, is obtained by closing 2 B, and leaving the other holes open. If these notes thus obtained be compared by a competent musician with any wind instrument of concert pitch, such as the flute, the truth of this assertion will be evident.

Musical authorities seem to have arrived at the somewhat hasty conclusion, that the Aztec people were only possessed of a knowledge of the so-called Pentatonic scale, but with all due deference to their opinion, I must beg leave to differ upon this point, as it is not probable that intervals which are so easily obtained, were unknown to artisans capable of manufacturing these flageolets of terra-cotta, pitched in different keys, and of determining the exact distance apart of the finger-holes. This superior knowledge of their artisans is still further shown by the ingenious and scientific arrangement of the finger-perforations made in their whistles, or pitch-pipes, described hereafter, which, when covered, reduce the tone exactly a fourth; equaling the dominant of the scale.

The more I study the musical instruments of these people, the firmer becomes my conviction that they must have possessed a full knowledge of the diatonic and chromatic scales; which can be produced upon the four-holed clay flageolets by any one capable of manipulating our modern flutes.

The instrument which stands in B flat, can be made to produce that note by closing all the holes and the bell (full finger-stop). B natural is more difficult to obtain, and is produced by a slight movement, with much care and precision, of the little finger outward from the centre of the cup-like cavity; from which fact, and the skill required to produce C sharp, E flat and G natural, I am inclined to believe that the Aztecs, like the ancient Peruvians, possessed musicians trained from early youth, who no doubt assisted in their religious ceremonies and festivals. C natural is produced with the four holes closed, and the cup-like cavity open.[1] C sharp, 1 A half open, 2 B, 3 C, 4 D closed; D natural, 1 A entirely open, 2 B, 3 C and 4 D closed. E flat, or the *fourth* of the scale, is produced by leaving 1 A open, 2 B half-closed, 3 C and 4 D closed; E natural, 2 B open, 1 A, 3 C and 4 D closed; F natural, 1 A and 2 B open, 3 C and 4 D closed;

[1] It may be seen in the Plate, that where it is necessary to close the cup-like cavity in these flageolets, S is used to indicate entirely closed, half S for half-closed, or half finger-stop, and O for open bell.

F sharp, 1 A open, 2 B closed (see Plate), 3 C open and 4 D closed; G natural, 1 A open, 2 B half-closed, 3 C open, and 4 D closed; A flat or G sharp, 1 A, 2 B, 3 C open, and 4 D closed. A natural, the *seventh* of the scale, 1 A open, 2 B closed, 3 C and 4 D open. B flat, *octave*, is obtained by leaving all the holes and the bell open.[1] It becomes apparent by the above scales obtained upon these four-fingered clay flageolets, representing the keys of B flat, B natural, C natural and F sharp, that many interesting combinations could be obtained by their simultaneous use, such as concerted pieces, each flageolet sustaining a part.

Professor J. S. Cox says: "I cannot imagine what object they had in view for pitching their flageolets in different tones, unless each instrument was intended to perform a separate part, which when played together produced harmonious sounds; this method is used in our day by some of the fife and drum corps, there being three different kinds of fifes used in concert. . . . . They are too truthful in their various pitches (such as B natural, C natural, B flat, F sharp) for these to be accidental." These opinions of Professor Cox, whose reputation as a soloist upon the Boehm-flute is well known in America, cannot fail to impress the cautious observer that something more than mere accident is represented by these instruments standing in different keys.

The Aztec whistles, or pitch-pipes, in the collection of antiquities already mentioned, were ascertained to stand in the key of E flat, and together yield a full octave, so that four persons could play simple melodies upon them.[2] The fact that duplicates exist in several of the above-mentioned whistles and flageolets adds much probability to the theory already advanced, that these are not tones which happen to stand in the keys enumerated, but that

[1] It has been suggested that it was possible to produce the entire scale (without closing the bell) by means of careful finger-manipulation upon any reed-formed instrument with four holes. Six notes can be obtained by careful fingering; an approach to the seventh (though very imperfect and flat in sound) can be produced by leaving all the holes open, and blowing strongly. After repeated trials, I am of the opinion that there is no way of producing the octave upon these four-holed Aztec instruments, except by means of finger-stopping.

[2] I have numbered these pipes from one to eight (tonic to octave). They, with their existing duplicates, may be seen in the museum of the Academy of Natural Sciences of Philadelphia.

they were made by artisans who thoroughly understood the principles of the scales as known to us; moreover, upon these whistles a ninth, eleventh and twelfth can be obtained (the tenth or G natural is missing), which gives, with this exception, an octave and a fourth.

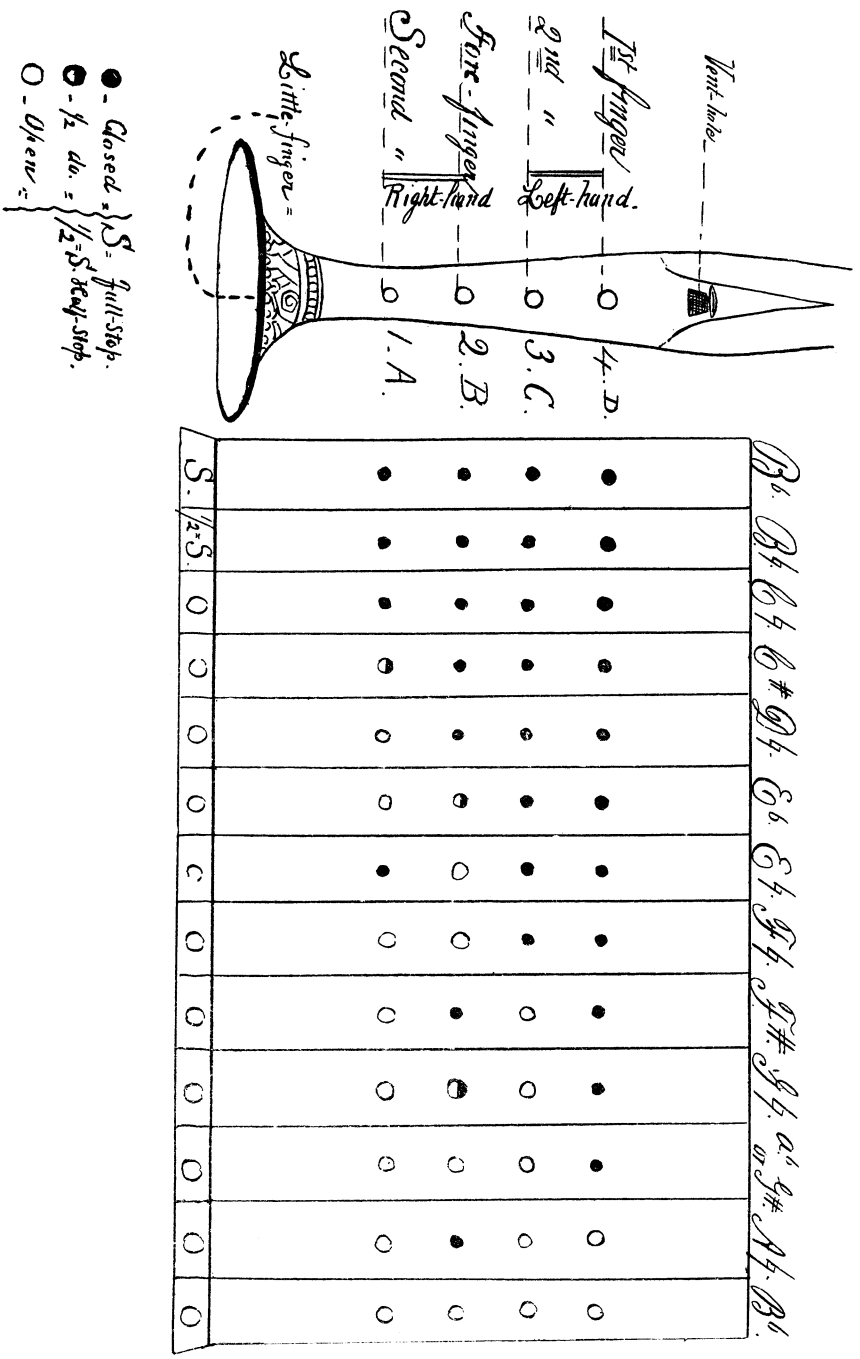
Certain grotesque decorations upon these instruments may have some signification; the one which produces E flat, or the tonic of the scale, possessing no ornamentation, is an exception to most all the others, which are enveloped by frog-like appendages or legs, with feet attached. The bodies are tipped with an ornament resembling the tails of young sparrows, and the underneath portion thereof is furnished with an appendage or button, pierced by a hole, through which a cord was passed by which it was probably attached to the body of the performer. (Plate III, fig. 3.)

The ingenious way in which the Aztec whistles are modeled is well worthy of description, and must have occupied a great deal of time to accomplish it. They have no doubt been made in four parts, like the flageolets, and also possess a clay reed, which is enveloped by the neck, to which is attached the body, furnished with a vent-hole. This body is a circular form, something like the bulb of a retort (such as used in our laboratories), and was no doubt fashioned upon a ball-shaped or circular form, and then cut into two portions; one of these was joined to the neck, and the other piece fastened to it by careful modeling. An example of this can be seen in the double whistle (Plate III, fig. 4), where these two parts are shown somewhat separated; no doubt the effect of the action of the heat while in the kiln. The object of thus forming the body in two portions can readily be seen by an examination of these instruments, which are, with few exceptions, very carefully made, and the interior portion of the body quite smooth and regular within, as any imperfection would interfere with the regularity and fulness of the sound. A smooth round form of some material was chosen upon which to model or shape the body portion, which it would be necessary to divide in two, so as to release it therefrom, thus explaining the division of the above-named parts. The bodies of these whistles are each pierced by a stop-hole, which, if left unclosed when the instrument is blown, gives a clear piercing sound; by covering the same, a note one-fourth below that given while open, is produced. This hole is generally placed to the

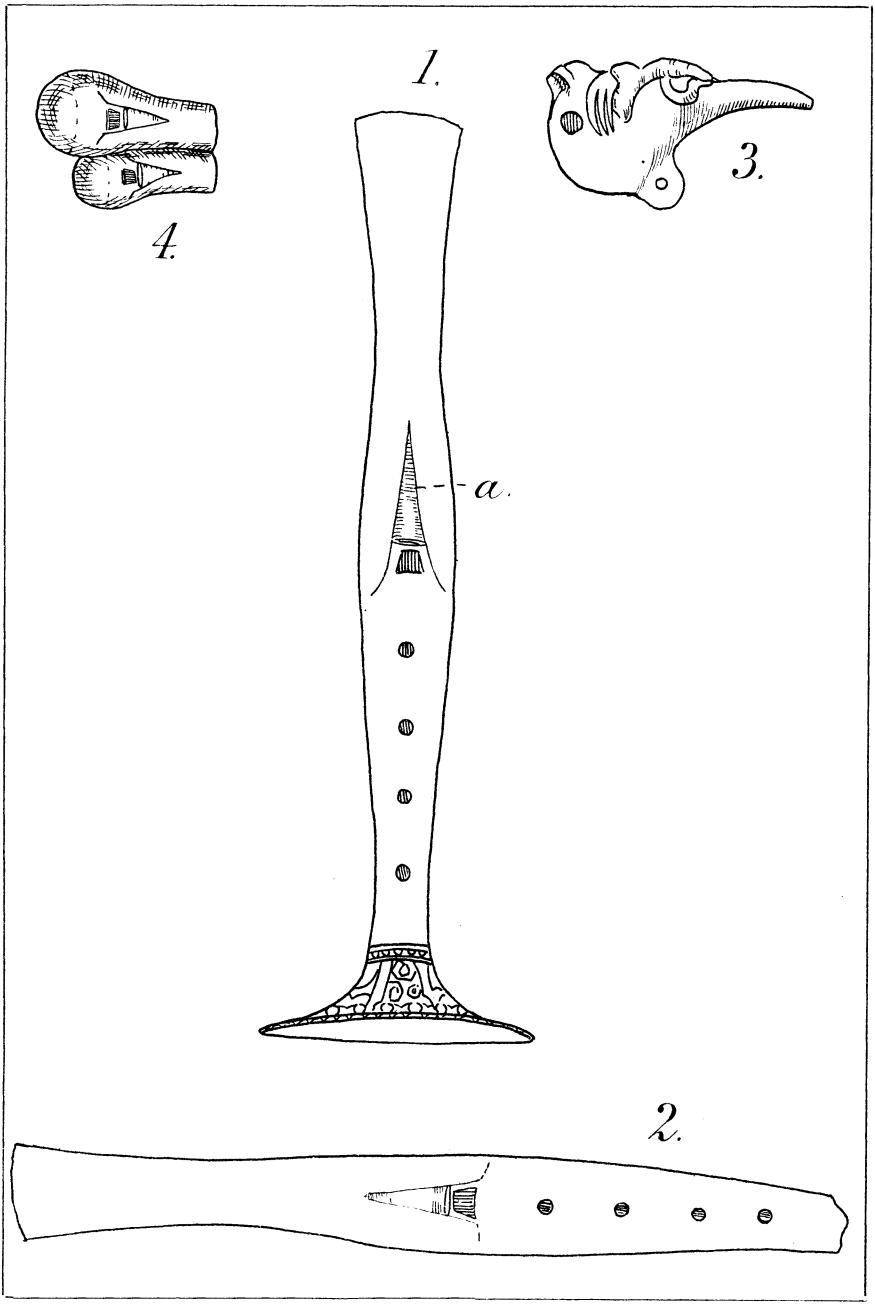
right side of a line drawn around the body from the centre of the vent. In playing the scale of E flat, all of the holes in these pipes are left open with the exception of that of pitch-pipe No. 2, which is closed, so as to produce F natural.

To recapitulate, it would appear: I. That upon the four-holed clay flageolets the chromatic and diatonic scales can be produced with a full octave. II. That the clay whistles or pitch-pipes, which may be manipulated in quartette, will produce an octave and a fourth. III. From the facts above shown, the Aztecs must have possessed a knowledge of the scales as known to us, which has been fully tested by comparison with the flute and organ.

These superior attainments in the science of music suggest that musicians of our day have arrived at a somewhat hasty decision in regard to the music of these ancient people having been confined within the narrow limits of a so-called pentatonic scale, as it is highly probable that they may have had melodies containing all the tones of the chromatic scale. Their ingenuity and skill in the production of these instruments may well claim the admiration of modern musicians and artisans. It is earnestly hoped that a much-neglected branch of American ethnology—the study of native American music—will hereafter receive the proper investigation due so important a subject. No doubt the researches now in progress, under the auspices of the Bureau of Ethnology at Washington, will develop many interesting facts in this connection.



CRESSON ON AZTEC MUSIC.



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